MARS AS A LIVING PLANET

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IN contradistinction to the Moon as a *dead* world, I can speak of Mars and the Earth as *living* planets.

It is the purpose of this paper to present observational evidence to show that Mars has an atmosphere and is imbued with a considerable degree of warmth—that the changes observed upon its surface would necessitate such an atmosphere, in fact that the planet approaches the conditions that we know upon the Earth, even if it does not quite attain them.

To approximate the unchangeableness and sterility seen on the Moon—because of its lack of atmosphere and the intense cold due to its long night—it would be necessary here on Earth to resort to a vacuum or other preservatives. A similar condition on Mars is inconceivable from what we know of its surface features and the changes which have occurred in them from the earliest reliable observations. Disintegration and growth depend, not only on the action produced by atmosphere but also on the presence of organisms. It is true that inorganic material suffers change from mechanical and chemical action, but this again admits water and atmosphere into the consideration of its cause.

CLOUD OVER SOUTHERN PORTION OF SYRTIS MAJOR

1903 1920

June 1 P. L. May 26 G. H. H.

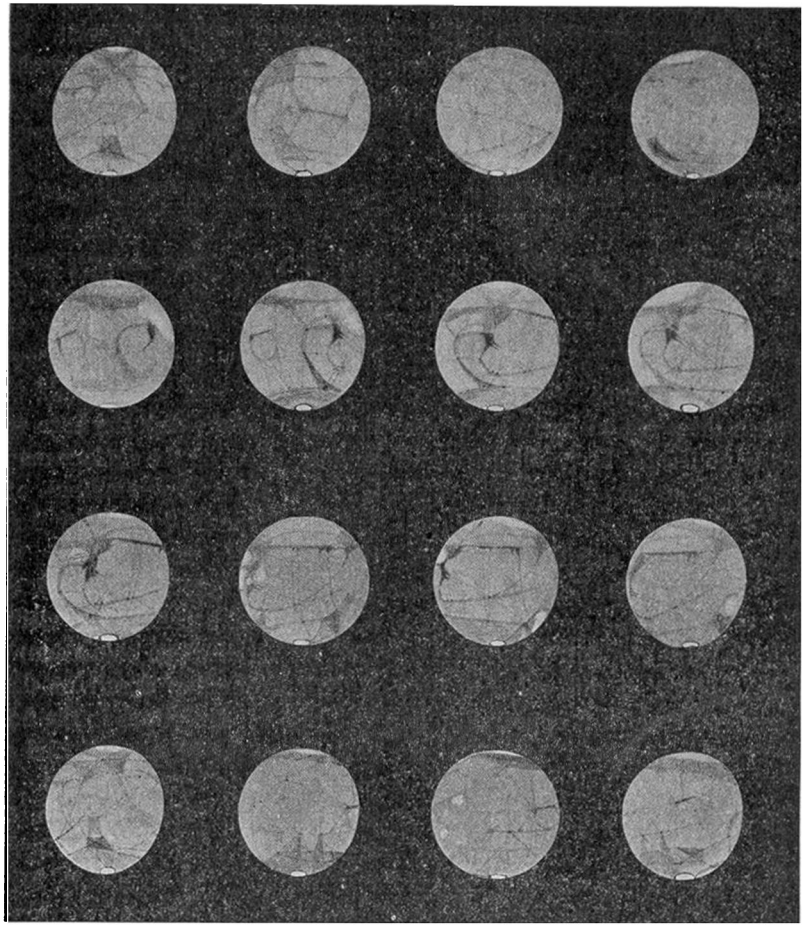
The germination and gemination of the canals from the time of Schiaparelli show an unaccountable seasonal change, if we are to believe in a cold as intense as that which some people have suggested exists, or an atmosphere so thin that it would be lacking in those gases commonly supposed necessary for the support of organic material. One would hardly suppose that an atmosphere sufficiently dense to produce mechanical changes to the extent that they have been observed in inorganic matter, would have little or no effect in the production of organisms.

The dependence of the canals on the seasons of Mars for their visibility established by Lowell, and the variations in the dark areas are confirmatory evidence of an atmosphere; for these changes would be inexplicable on any object, most certainly a planet, placed in a refrigerator or vacuum bell.

There were, at this opposition, two regions on the planet where a considerable haze existed; this was very evident near either limb, but when these regions were on or near the center of the disk the haze was only noticeable by its diffusing and dimming effect on the surface markings. It appeared to cover the Syrtis Major and its surroundings, and also a region opposite—about the Lacus Lunae south of the Mare Acidalium. Detail outside of these regions was usually clear cut.

When on the limb or terminator, i. e., near sunrise or sunset, the haze above these regions seemed to condense and became itself visible in the form of a dull blue-white covering very easily seen on account of the contrast of this color to that of the surrounding desert or dark areas over which it appeared to hang. These condensations in the haze remained of a nearly constant area close up to the terminator, and remained close to the terminator during the time that they lasted. In consequence those areas of the planet coming onto the disk from the terminator or leaving the disk, appeared from behind this covering or disappeared under it in a remarkable manner. The change in formation of these blue-white areas was of a character that one would expect if it had been atmospheric and cloud-like in nature. It was decidedly an evening and morning effect. The shift of the surface of the planet with respect to these apparent clouds was incompatible with the assumption that they belonged to the surface, but pointed expressly to the fact that they were above the surface and atmospheric.

This article is illustrated by two plates. The first shows two drawings, one made in 1903 by Dr. Lowell, the other in 1920, by myself. Dr. Lowell's drawing of June 1, 1903, depicts a season, for that region on Mars, corresponding on our Earth to August 6. It is interesting to note that my drawing of May 26, 1920, shown with his, corresponds in season to about August 13. It will be noticed that though a period of seventeen years has elapsed, the cloud formation is very similar over



MARS 1920

Mar. 8	Mar. 5	May 11	May 11
$\lambda =$ 34	$\lambda =$ 63	$\lambda =$ 127	$\lambda =$ 91
Apr. 28	May 26	May 24	May 26
$\lambda =$ 250	$\lambda =$ 262	$\lambda =$ 305	$\lambda =$ 308
May 22	Apr. 13	May 24	June 21
$\lambda =$ 312	$\lambda =$ 344	$\lambda =$ 342	$\lambda =$ 1
June 21	June 5	May 7	June 4
$\lambda =$ 51	$\lambda =$ 168	$\lambda =$ 166	$\lambda =$ 211

George Hall Hamilton.

$\lambda =$ Longitude of Central Meridian at time of drawing.

the Syrtis at approximately the same season. The drawings, of course, have only been used in comparison for this particular feature.

The second plate, made up of sixteen selected drawings, not only shows the curious cloud formation over the Syrtis Major and the Mare Acidalium, but also gives one a complete view of the Martian surface except that portion near the southern pole which was continuously turned away from us at this opposition.

It will be noticed from these drawings that both the Syrtis and the Mare Acidalium are nearly completely free from cloud when on the center of the disk, but that they are covered by cloud to a great extent when near the limb or terminator.

The drawings, which are typical of all those made at this opposition, show unmistakeable evidence of a considerable atmosphere. This can not be wondered at when one realizes the amount of water vapor transported from one pole to the other each Martian half-year: it is an atmosphere quite capable of being, in fact, a mechanical transferer of this material from pole to pole.

That Mars is a living planet seems certain from these changes that are seen to continually take place on its surface and above the ground. The dark areas and canals are seemingly, at least in part, organic. The polar caps by their disappearance and reappearance each year, imply *both mechanical and physical* change, as do also the daily variations in the cloud formations.

How far organic evolution has progressed it would be hard to tell, but that there is a succession of seasons on Mars as on the Earth, and consequent germination is evident.